Development of An Overlay Design Procedure For New York State

STUDY PROPOSAL FOR RESEARCH PROJECT 224-1

JULY 1994

ENGINEERING RESEARCH AND DEVELOPMENT BUREAU
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
Mario M. Cuomo, Governor/John C. Egan, Commissioner

A. Identification

Study Title: DEVELOPMENT OF AN OVERLAY DESIGN PROCEDURE FOR NEW YORK STATE
Research Project 224-01

Agency: Engineering Research and Development Bureau
New York State Department of Transportation
State Campus, Albany, New York 12232

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Engineering Research Specialist I

Research Supervisor: Wei-Shih Yang
Engineering Research Specialist II

B. Problem Statement

FHWA's new pavement policy requires that each state highway agency have a pavement rehabilitation selection process acceptable to FHWA, including a methodology for structural design. The process must also include engineering analyses of alternative rehabilitation strategies. The Department's Pavement Management System Steering Committee recommended that models be developed to estimate the effect of design on a pavement's remaining life. To meet this request, NYSDOT initiated Project 202 ("Adapting the AASHTO Pavement Design Guide to New York State Procedures) to evaluate aspects of the 1986 AASHTO Guide for Design of Pavement Structures. The end-product of Project 202 was the New York State Thickness Design Manual for New and Reconstructed Pavements. However, it is also necessary to develop a rational structural overlay design methodology for engineering analyses relevant to New York State that can be applied under all combinations of existing pavement conditions, soil and material properties, reliability, and traffic.

C. Objective

The purpose is to develop an overlay design procedure suitable for New York State and acceptable to FHWA, with the following objectives:

1. Studying and evaluating various existing overlay design procedures, including the revised AASHTO overlay design procedure, to determine if any procedure meets or can be modified to meet New York's needs.

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2. Collecting available historical data on actual performance of overlaid pavements.

3. Adapting and/or developing overlay treatment performance models, using historical data to match actual New York performance, materials, and environmental conditions to calibrate the recommended procedures.

4. Supporting the Department in implementation of the new overlay design procedure.

D. Background

At present, the New York State Department of Transportation does have a comprehensive pavement rehabilitation procedure that includes pavement evaluation, treatment guidelines, and economic analyses based on pavement condition. In this procedure, service lives have been estimated for all treatments, based on current experience and engineering judgment. However, these expected service lives are appropriate only for highways with Average Annual Daily Traffic (AADT) counts of 12,000 to 35,000 with about 5-percent trucks. It thus is necessary to adapt existing performance prediction models and/or develop new modes that can meet New York's climate, traffic, and pavement conditions.

E. Benefits

The proposed new overlay design procedure will achieve long-term economic benefits by producing pavements with improved performance, reduced maintenance and repair, and favorable life-cycle costs.

F. Implementation

An overlay design manual will be developed with the support from FHWA's pavement experts in Washington and Albany, and the Department's new Overlay Design Task Force which will include representatives from the three Technical Services Bureaus, Design Quality Assurance Bureau, Data Services Bureau, and Pavement Management Section of the Office of Operations. All issues involving implementation of the new overlay design procedure will be resolved by this Task Force.

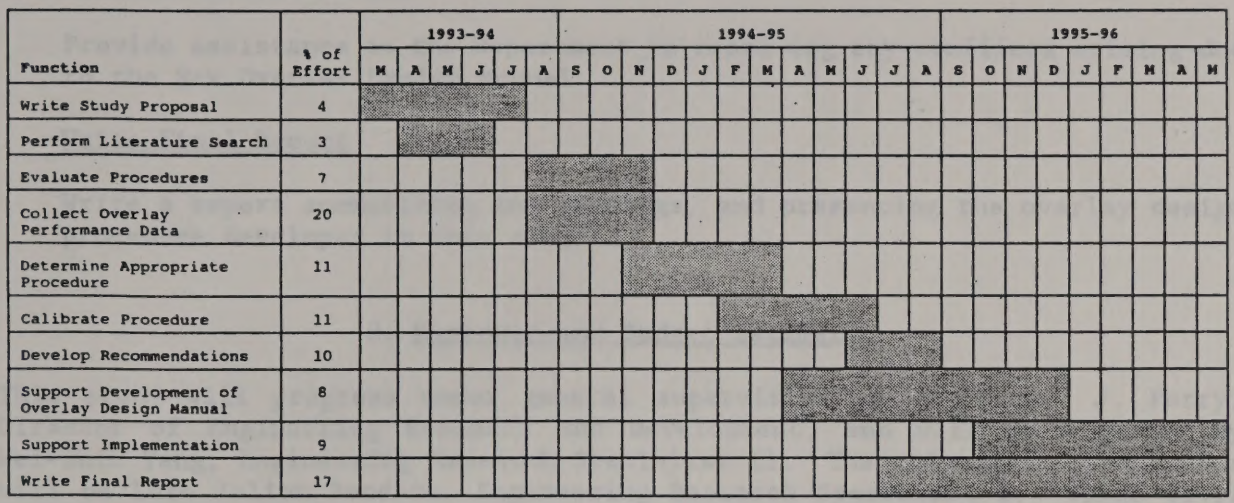
G. Work Plan

The work will proceed approximately as outlined in Figure 1. A study period of 26 months is proposed, with tasks to accomplish the following objectives:

1. Write Study Proposal

   Refine the problem statement, and outline the way in which the study will be performed.

Figure 1. Work-time schedule.



2. Perform Literature Search

Search literature to identify available resources and provide background material.

3. Evaluate Procedures

Analyze current overlay procedures to determine their bases.

4. Collect Overlay Performance Data

Determine historical performance of overlays in New York State.

5. Determine Appropriate Procedure

Based on historical data and output from all the procedures analyzed, determine which procedure best predicts overlay performance in New York State.

6. Calibrate Procedure

Once the best procedure is determined, historical performance data will be used to calibrate it to New York State overlay performance.

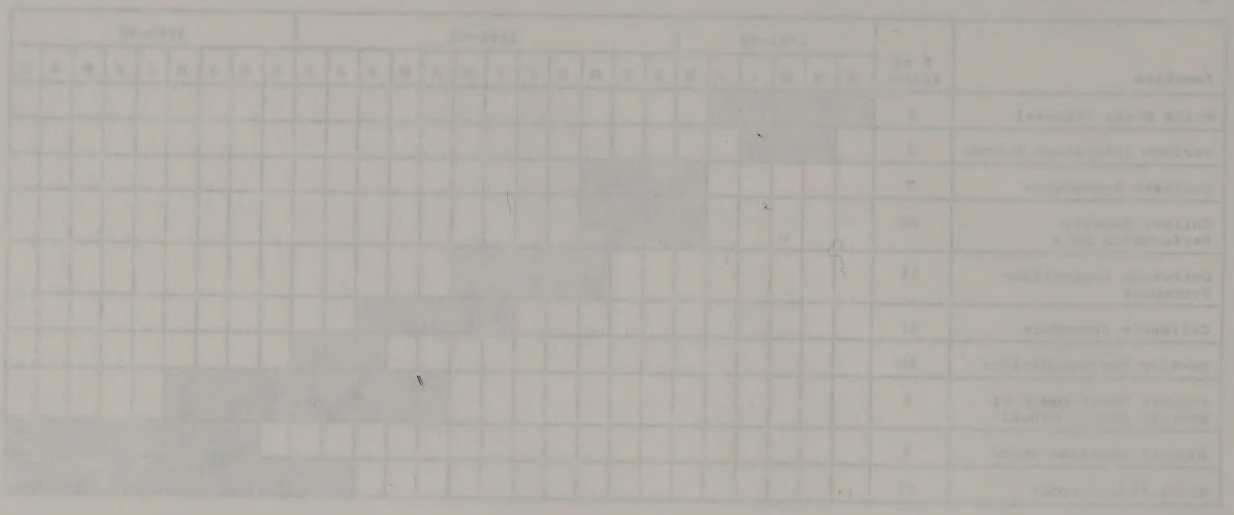
7. Develop Recommendations

Summarize findings of the study and recommend the appropriate procedure.

8. Support Development of Overlay Design Manual

Provide technical assistance to the Department in development of an Overlay Design Manual.

Figure 1. Work-time schedule.



9. Support Implementation

Provide assistance to the Department in resolving any conflicts arising due to the New Overlay Design Manual.

10. Write Final Report

Write a report summarizing the findings, and presenting the overlay design procedure developed in this study.

H. Manpower and Budget Estimates

This study will progress under general supervision of Dr. Robert J. Perry, Director of Engineering Research and Development, and will be directed by Wei-Shih Yang, Engineering Research Specialist II. The principal investigator will be Luis Julian Bendaña, Engineering Research Specialist I. Three Civil Engineers I will be involved in this project. Personnel and budgeting details are given in Tables 1 and 2.

Table 1. Budget estimate by function.

	Person-Weeks Required				
Function	**ERS II**	**ERS I**	**CE I**	**CE I**	**CE I**
Write Study Proposal	1	1	1	1	
Perform Literature Search		1	1	1	
Evaluate Procedures	1	2	2	2	
Collect Overlay Performance Data		2	4	4	10
Determine Appropriate Procedure		1	3	3	4
Calibrate Procedure		1	3	3	4
Develop Recommendations	1	2	2	2	2
Support Development of Overlay Design Manual	2	3	2	2	
Support Implementation	2	3	2	2	
Write Final Report	1	4	5	5	2
Total Person-Weeks	8	20	25	25	22
Estimated Cost	$11,000	$22,000	$23,000	$23,000	$21,000
Total Personal Services					$100,000

Table 2. Budget estimate by project duration.

	Person-Weeks Required		
Skill Level	**1993-94**	**1994-95**	**1995-96**
ERS II	0	5	3
ERS I	3	13	4
CE I	4	18	3
CE I	4	18	3
CE I	3	19	0
Estimated Cost	$13,000	$73,000	$14,000
Total Personal Services			$100,000

Overlay Design Procedure

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